pathologist, and W. B. Hodgson, who became professor of political economy in Edinburgh University. They should be read by everyone interested in education, and this convenient little volume at the cost of one shilling will enable them to do so.

Sixty-three years have elapsed since these stimulating and powerful discourses were delivered, and some of the illustrative references to the scientific views as well as to the popular superstitions current at that time require explanation or modification. This is provided by a series of useful notes inserted by the editor after each lecture.

The lectures are not occupied with denunciations of the "elegant imbecility of classical learning," but with an exposition from various points of view of the advantages to education of the observation of natural phenomena and the scientific study of language. In 1854 there were not more than two or three schools in England where natural science was taught, and in the universities such subjects were almost ignored except where they formed an integral, though subordinate, part of the medical curriculum. We have moved on since that time. All the large schools and some of the small are provided with laboratories and teachers more or less competent. The time given to experiment and observation is, however, quite insufficient, and until headmasters with purely literary qualifications and sympathies are got rid of progress will still be slow.

Some Questions of Phonetic Theory. By Dr. Wilfrid Perrett. Pp. vi+110. (University of London Press, 1916.) Price 2s. 6d.

This book forms a notable contribution to the literature on the science of speech. The first chapter exposes some current misconceptions as to the position of rest of the organs of speech. In the remaining three chapters (entitled "Willis on Vowel Sounds," "The Wheatstone Test," and "The Compass of the Mouth") Dr. Perrett deals with the intricate subject of vowel-pitches. He gives examples of the hopelessly divergent results which have been arrived at by different authorities on acoustics, and endeavours, in our opinion with success, to bring some order into the chaos. Naturally the work of those who have contributed to bring about the chaos comes in for strong criticism. Upon Helmholtz Dr. Perrett is particularly severe; he shows that "wherever it bears upon phonetics Helmholtz's book has no right to be considered authoritative," and states that even in other branches of the theory of sound Helmholtz attained a reputation to which the quality of his work did not entitle him. The Helmholtzian harmonic overtone theory of vowel-quality is shown to be untenable by simple experiments described on pp. 79, 81, and 107—experiments which may be performed without difficulty by any phonetically trained person.

The methods by which Dr. Perrett arrives at his interesting table of vowel-pitches (p. 98) appear to us to be sound.

We commend the work to the notice not only of those interested in the science of speech, but also of students of sound generally. D. J.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of Nature. *No notice is taken of anonymous communications.]*

Science Teaching and National Character.

I was asked to address a Workers' Educational Association meeting; was prevented by illness; and wrote a long letter to the chairman. Phrases from this letter, referring to the teaching of science, very much abbreviated, appeared in the newspapers. Now Nature (April 19) flagellates me for what I am supposed to have said. And, indeed, if I had meant anything so grotesque as you naturally inferred from the disconnected phrases you saw, I should have deserved all your strictures.

What I *did* say, briefly, was that we had seriously neglected science, not so much in schools as in higher work and in practical life; that we were realising this; but that there was a danger of our trying to mend matters in the wrong way, by cramming too much science into the schools, where, certainly up to the age of sixteen, the boy would profit most from an education in the "humanities," even if he intended to devote himself to science later. By the "humanities" I meant the studies which deal with the thoughts and actions of man. I added that there was another danger, quite distinct in character, attaching to our new-found reverence for physical science, and this was that we might be tempted to imagine that we could apply its concepts and methods to the totally different problems presented by human life. I do not remember whether on this occasion I used an illustration which I have used at other times: that of the older political economy, which, in trying to become an exact science setting forth unalterable laws, had lost touch with the realities of social life. But I *did* give an illustration from Germany, where, I urged, the attempt to apply the Darwinian theory (misinterpreted) to the life of that strange justice-loving animal, man, had produced the hideous political philosophy of Treitschke and modern Germany, and had largely contributed to bring about the war. I did not say, or mean, or think anything so absurd as that science caused the war, or that Germany's soul had been poisoned because she took science more seriously than we. But it is possible that some of my phrases, hurriedly written from a sick bed, may have conveyed that impression. If so, I am glad that you have directed attention to them. Ramsay Muir.

Manchester, April 23.

We are glad to know that the published extracts from Prof. Ramsay Muir's letter do not represent his views as to the influence of science upon national character. Prof. Muir need not fear, however, that too much attention will be given to science teaching in schools, or that British men of science are likely to leave the working of the human spirit out of consideration because this has been done by German historians and philosophers. All that the most advanced reformers of school curricula ask is that the natural sciences (with geography) shall be given approximately the same amount of school time as three other main groups, namely, languages and literature, English and history, mathematics and other subjects, and that up to the age of about sixteen years all these subjects should be fairly represented as essential parts of a general educational course.

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There is no intention of "cramming too much science into the schools," but a strong case can be made out against the present cramming of classics, whether considered as a means of mental development or a preparation for life. The assumption that science is a special study, to be taken up after the age of sixteen or so, while what are called the "humanities," but are chiefly dead languages and literature, are not specialised, is a fallacy which advocates of literary learning persist in believing, though it has been exposed over and over again.

It is possible that a perverted view of Darwinism has been put forward in Germany in justification of the doctrine of "frightfulness," but naturalists as a body must not be held responsible for this conception, which was, indeed, repudiated completely by Huxley in his "Evolution and Ethics." The ancient and modern histories studied in schools and colleges are mainly concerned with wars and dynasties, and it is to these "humanities" rather than to science that we must look for the origin of the German mental condition and the conduct of the present conflict.—Ed., Nature.

The Frequency of Snow in London.

I think the number of days with snow in the early months of 1917, as quoted in Mr. Harding's article in Nature of April 19 according to the records of an observer at Wandsworth Common, is too low for the metropolitan district generally, inasmuch as I have recorded snowfall, chiefly at Hampstead, but partly also at Kensington, on no fewer than forty-seven days during the past winter, distributed as follows: November, 1; December, 3; January, 20; February, 4; March, 11; April, 8; out of which forty-three belong to 1917—a figure nine in excess of that quoted by Mr. Harding. I do not think the discrepancy is due to Hampstead's height some three or four hundred feet above the more central parts of London, inasmuch as a difference of altitude of this small order tells more effectively upon the length of time snow lies on the ground than on its frequency of falling; but I suggest it may arise from the omission of days of very slight snowfall, of days with sleet, or, possibly, even from a failure to recognise uncommon varieties of snow.

An interesting case of an unusual variety of snow, which I heard superficial observers calling "sleet," in spite of the fact that the precipitation was entirely free from liquid drops, occurred during the week-end of January 20–21, when there fell in London a continuous frozen drizzle composed of fine crystalline particles, gradually whitening roofs and open spaces with a thin layer having the appearance of ordinary snow. Now, if the physical criterion of rain is the spherical drop of water, of hail the stone, pellet, or granule of compact ice, and of snow the individually formed crystal of ice, whether it falls alone, or stuck together with others in large flakes, or broken up by wind into powdery fragments, it is clear that the precipitation of January 20–21 had the essential character of snow, and was not a transition form between snow and rain or between snow and hail.

L. C. W. Bonacina.

30 Parliament Hill, Hampstead, N.W.3.,
April 28.

Scarcity of Wasps in Kashmir in 1916.

Reading the correspondence in Nature on the scarcity of wasps in England, and the interesting article by Prof. Carpenter (Nature, January 25), suggested to me that it might be worth while to record my experience in Srinagar, Kashmir, during the years 1915 and 1916, because of the curious analogy.

During the autumn of 1915 two species of wasp were observed, one of these somewhat resembling *Vespa vulgaris*, and the other larger and more like a hornet. These were both excessively abundant in and around the house I occupied. The large suspended nests of both species, covered with active workers, were in almost every bush and shrub near the house and attached to the walls of the house, and it was only by repeated efforts that we could prevent the insects starting new colonies on the ceilings of the rooms in the house.

The abnormally dry season in Kashmir beginning in May, 1915, may have been specially favourable for the development of these wasps, but if so it is not easy to account for their subsequent scarcity. As in England, the year 1916 was remarkable for the rareness of wasps. The winter was mild and dry, and the shortage of rain persisted through the spring. Scarcely a single wasp of the smaller species was seen during the summer and autumn following. The only nests of the larger kind I saw were two very small ones suspended from the woodwork of the spectroheliograph, where I could daily watch the process of construction. This, however, was a most tedious operation, for after several months the nests were no larger than $1\frac{1}{2}$ in. or 2 in. in diameter—that is, about a quarter the size attained in 1915—and instead of swarms of active workers, only one or two rather sluggish insects were seen on the nests.

The apparent despondency of the wasps in 1916 was in strong contrast with their energy during the previous season. Yet, so far as human beings could judge, the two seasons were equally inspiring as regards clear blue skies and brilliant sun.

Is it a mere coincidence that wasps of different species were one year abundant, the next year scarce, in such widely distant localities as England and Kashmir?

J. Evershed.

The Observatory, Kodaikanal, South India,
March 14.

Ceratonia Siliqua and the Carat Weight.

It is usually stated that the carat weight of jewellers and diamond merchants is derived from the hard seeds of the locust tree, *Ceratonia siliqua*, which were anciently used as weights. Having had occasion to obtain some of the beans, I weighed several of the seeds to see what sort of error would be incurred if they were used as weights. Out of forty-four seeds, four were shrivelled and obviously abnormal, weighing from 0·037 to 0·064 grm. each; the remaining forty seeds varied from 0·120 to 0·268 grm. The average weight of a seed was 0·2004 grm., with a probable variation of ±0·0235. The median was 0·207, and the modal average 0·204. The variations were not well distributed. The old diamond carat, of which $151\frac{1}{2}$ made 1 oz. troy, would weigh 0·205 grm.; the decimal carat now in use is 0·200 grm. It would appear, therefore, that the carat weight could be recovered with some approach to accuracy by weighing a number of seeds of the locust bean. It is also evident that the use of such seeds as weights must have given opportunities for fraudulent dealing in the precious commodities gauged by means of them, since deviations of from 30 to 40 per cent. from the average may occur. The variations in weight due to varying humidity of the air are not great; twenty-five seeds exposed to the air of a room for twenty-three hours in rainy weather gained 0·06 per cent. in weight, and after thirty-six hours over sulphuric acid lost 1·71 per cent. in weight.

J. H. Coste.

Utopia, Teddington, April 23.

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